AIR QUALITY

PREPARED BY

CENTRAL NAUGATUCK VALLEY
REGIONAL PLANNING AGENCY
20 EAST MAIN STREET
WATERBURY, CONN. 06702

JULY, 1975

701 PROJECT: CONNECTICUT CPA-CT-01-00-1034

THE PREPARATION OF THIS REPORT WAS FINANCED IN PART THROUGH AN URBAN PLANNING GRANT FROM THE U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT UNDER THE PROVISIONS OF SECTION 701 OF THE HOUSING ACT OF 1954, AS AMENDED; BY A REGIONAL PLANNING GRANT FROM THE DEPARTMENT OF PLANNING AND ENERGY POLICY, STATE OF CONNECTICUT; AND BY CONTRIBUTIONS FROM MEMBER MUNICIPALITIES OF THE CENTRAL NAUGATUCK VALLEY REGION.

OFFICIALLY ADOPTED
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ABSTRACT:	This report analyzes air quality data for the CNVR and its municipalities. The tables present information on past trends, current air quality conditions and air quality standards in the Region. Data contained in the tables include Department of Environmental Protection data, Health Statistics and information from other sources.

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1. INTRODUCTION

The problem of air pollution dates back to the earliest human settlements on earth when man huddled around his hearth to keep warm and cook his food. In the early days wood was the principal fuel source used by man but in latter years, it was replaced by coal and then by oil and natural gas and most recently by nuclear power. While each succeeding fuel source has tended to be a more efficient producer of energy than the previous fuel source, these new fuels have created new types of atmospheric pollutants many of which have been somewhat more toxic or hazardous than the emissions of the previous fuel source.

The problem of more toxic air pollutants has been compounded by the rapid urbanization of the population and the rapid growth of large industries causing greater numbers of people to be affected by larger concentrations of pollutants in the urban atmosphere. During the Industrial Revolution of the 19th century large factories belching out tons of smoke and particulates were said to have made midday London, England's sky look as dark as midnight.

In those days the billowing smoke of industry was considered to be a sign of progress and economic development rather than a serious health hazard to the general populous. However, in the last 30 years this attitude has changed considerably as (1) the American standard of living has increased and (2) as strong evidence has been gathered pointing to the adverse effects of air pollution on property values and the health of plants, animals and man.

One of the immediate consequences of the increased standard of living that began occurring after World War II, was a suburbanization of large numbers of urban residents. Certainly the desire for cleaner air along with a more pleasant rural environment contributed to this outmigration. Those who could afford to live further away from the odors and noise of the city moved to the suburbs and commuted to work in the central city.

While suburban residents sought clean air among other things for their own families, several urban air pollution disasters occurring in the late Forties and early Fifties made it clear that clean air was not simply a suburban luxury affordable by the well-off, but rather a prerequisite for the health and welfare of the entire nation. The air pollution disasters in Donora, Pennsylvania in 1948 and London, England in 1952 clearly showed that excessive levels of air pollutants were not only irritating to the health of many urban residents but, were often leading to increased death rates for the elderly, for children, and for those suffering from respiratory ailments.[1]

The 1948 Donora disaster was caused by a local industry which was emitting sulphur dioxide and sulphuric acid into the air of a small town. On the other hand the 1952 London Fog was caused by a combination of a long air stagnation coupled with excessive levels of sulphur dioxide and particulates from coal burning. In recent years a third type of air pollution disaster has been created by the gasoline-powered automobile. Automobile pollution, otherwise known as smog, became a noticeable urban problem in the Los Angeles area as early as 1945 and has since become a problem endemic to all large urban areas.[2] Today, as can be seen from the Table below, the automobile is responsible for the bulk of the air pollution problem in America, accounting for over 60 percent of all the pollutants released into the atmosphere.

[1] Cohen, Arlan, et al. Air Pollution Episodes, Health Services and Mental Health Administration Health Reports, June, 1971, pp. 537-549.
[2] Arthur Stern, Air Pollution, Volume II, Academic Press, 1968.

Total United States Air Pollution

	(Millions of Tons/Yr)			
Pollutant	Auto	Other	Total	Percent Auto
Hydrocarbons	12	7	19	63
Carbon Monoxide	66	5	71	93
Nitrogen Oxides	6	7	13	46
Sulphur Dioxide	1	25	26	4
Particulates	1	11	12	8
Total	86	55	141	61

SOURCE: The Sources of Air Pollution and their Content, U.S. Public Health Service, 1966 Pub. No. 1548

The growing levels and varieties of pollutants entering the urban atmosphere along with a growing awareness of the dangers posed by these pollutants, led the federal government to pass a series of laws culminating in the Clean Air Act of 1970. This law was complemented on the state level by the passage of Connecticut Public Act 872 creating the Department of Environmental Protection (DEP) and giving the DEP Commissioner the responsibility for preventing and abating air pollution within the state.

Federal and State Regulations

The Clean Air Act of 1970 was important for four reasons: (1) it created Air Quality Control Regions within the State; (2) it established standards for hazardous air pollutants; (3) it required automobile manufacturers to install emission control devices in all new light duty vehicles; and (4) it required the State to develop an air quality implementation plan to achieve the federal air quality standards by 1975.

The Air Quality Control Regions (AQCR) in Connecticut were established to follow the boundaries of the existing regional planning agencies in order to facilitate

subregional air quality planning. As can be seen from Figure 1 the Central Naugatuck Valley Region is a subregion of the New Haven-Hartford-Springfield Air Quality Control Region. While the boundaries of the AQCR were made to facilitate subregional implementation of the air quality plan, air pollution as an atmospheric problem recognizes no political boundaries. As such, the air pollution problem encountered in the AQCR or in the CNVR are an amalgam of local emissions blown in from Fairfield County, New Jersey, New York or Massachussetts. As an example, in 1972 the Department of Environmental Protection estimated that over 15 percent of all particulate matter and as much as two-thirds of ozone measured in Connecticut were the result of emissions originating from New York, Massachussetts or Fairfield County.[3] For this reason achievement of National Ambient Air Quality Standards in the CNVR will depend to some extent on the success of other subregions of the state and other bordering states in achieving the National Ambient Air Quality Standards.

Perhaps the most significant contribution made by the Clean Air Act was the establishment of National Ambient Air Quality Standards. As of April 30, 1971 the Environmental Protection Agency (EPA) forumulated national primary and secondary standards for six major classes of pollutants.[4] The primary standards are designed to protect public health and the secondary standards are designed to protect public welfare by limiting damage to property or plants and improving air aesthetics. The federal standards are presented in Table I and are identical to the air quality standards adopted by the State of Connecticut.

In order to achieve these standards, the Clean Air Act required that each state adopt and submit a plan to implement, maintain, and enforce the national primary and secondary standards so that ambient air quality will reach acceptable levels within three years time. While Connecticut is supposed to be in

[3]Department of Environmental Protection, Air Quality Implementation Plan, 1972, p.116 and Ozone Transport, by R.A. Rubino, J. Margyar and L. Bruckman, 1975, a paper to be delivered at the 68th Annual Air Pollution Conference in Boston, MA.

[4]Ibid., p.3

compliance with the Standards as of 1975, the DEP will seek an extension of the deadline to mid 1977 as soon as its Transportation Control Strategy is submitted and approved by EPA. The 1970 Clean Air Act also stipulated that approval of the State Plan was contingent on inclusion of,

> "emission limitations, schedules, and timetables for compliance with such limitations, and such other measures as may be necessary to insure attainment and maintenance of such primary or secondary standards, including, but not limited to, land use and transportation controls."[5]

Furthermore the Act required the State to regulate the type of construction and the location of construction within the State to insure that ambient air quality standards will not be violated in future years by unplanned land uses. As such the Act requires the State to

> "provide for adequate authority to prevent the construction or modification of any new source to which a standard or performance will apply at any location which the state determines will prevent the attainment of maintenance within any air quality control region (or portion thereof) within such state of a national ambient air quality primary or secondary standard."[6]

The intent of these three provisions of the Clean Air Act concerning land use, transportation and construction control strategies was to make air quality a significant variable influencing future state or regional plans of development. However, since the Clean Air Act gave State Air Pollution Agencies very little enforcement power over transportation and land uses, the effectiveness of State efforts to improve air quality will depend upon local and regional cooperation.

Types and Sources of Air Pollution in the Central Naugatuck Valley

The primary sources of air pollution in the CNVR are from automobile emissions, fuel combustion for home and industrial heating, industrial process pollutants, and the incineration of municipal refuse. Each of these sources is responsible for a variety of different kinds of air pollutants many of which are health' hazards singly or in combination with other air pollutants in the atmosphere. Table VIII lists the primary pollutants associated with each of the above categories found in the Central Naugatuck Valley Region. It does not include many

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[5] Environmental Protection Agency, The Clean Air Act, December, 1970, p.11.
[6] Ibid., p.12.

types of industrial pollutants emitted by several of the large factories and businesses in Naugatuck and Waterbury. As can be seen from Table IVA there are twelve large point source polluters within the Central Naugatuck Valley Region which emit over 100 tons of pollutants a year. These industrial emissions include such pollutants as chemical powders, acid mists, metal and rubber particulates, oil sprays, organic and inorganic compounds, cement vapors, plasticizers, nitric acid and a host of other pollutants. While these point source polluters are emitting sizable quantities of pollutants into the Waterbury and Naugatuck atmosphere in most cases these are controlled emissions which have been found to be in compliance with the Department of Environmental Protection's emission rate standards for industrial process losses. Nonetheless some of the pollutants being emitted into the atmosphere still represent emissions from uncontrolled sources which have not complied with air quality regulations. While these pollutants may pose little danger for the surrounding municipalities on occassion they have posed a real threat to the health and public welfare of people living or working near the site of these industries.

As an example, on July 18, 1974 the Department of Environmental Protection closed down the Intercontinental Chemical Corporation in Watertown after residents complained that hydrofluoric acid fumes released by the company were causing extensive property damage and were jeopardizing the health of local residents. The acid was being released in concentrations which were sufficient to etch glass on nearby homes and severely affect human health. As a result of these dangerous conditions court orders shut down the plant in 1974 and it has not since reopened. According to an enforcement officer at DEP this is the only point source polluter in the state which has been forced to close down because of violations of state air quality regulations.

As of April, 1975 there were 12 large direct source polluters in the CNVR (see Table IV-B)which were in violation of the state Air Quality regulations.[7] While

[7]The Compliance Division of the Department of Environmental Protection, Compliance Schedule Book, April, 1975.

most of these companies may actually be in compliance with the air quality regulations they must wait for the Department of Environmental Protection enforcement unit to retest their emission control equipment before they are officially classified as in compliance. As of May, 1975 the Air Compliance Unit at DEP indicated that there were only 10 companies which were still technically in violation of the DEP regulations. However one enforcement officer felt that four and possibly five of the ten companies are probably in compliance but because of the slow retesting process carried out by DEP it may take some time before these companies are officially determined to be in compliance.[8] The remaining five companies are expected to take considerably longer to comply because (1) installation of costly emission control equipment would cause these companies economic hardships at the present time or (2) because the present emission control equipment used by the company does not meet the DEP emission rate standards.

As can be seen from Table IV-B Scovill Manufacturing Company, Waterbury Rolling Mills, Bristol Flowed Gasket, Fleischer Finishing Company and Uniroyal Footwear may take until 1976 before they are able to comply.

Another facility which may be in violation of state air quality regulations is the Waterbury Municipal Incinerator. While no state order has been issued on this facility, mainly because it is being phased out of existence and replaced by the State's resource recovery program, one enforcement officer and one of DEP's attorneys indicated that Waterbury's incinerator is probably in violation of State air quality regulations. At present this facility emits over 450 tons of pollutants annually and will probably continue to do so until the Connecticut Resource Recovery Agency constructs a solid waste recovery facility to serve the Central Naugatuck Valley Region.

8 Interview with Don Helfner, Enforcement Officer of the Department of Environmental Protection, April, 1975.

While the 1975 CRRA plan estimates that a facility will be constructed in the CNVR by 1978, one local official indicates that it is unlikely to be operational before 1980.[9] In the interim years the State is not likely to enforce the regulations governing municipal incinerators since DEP recognizes that the installation of costly emission control devices on the Waterbury facility would place a severe financial burden on the City for equipment which would become obsolete once the CRRA facility is built.

Air Quality Monitoring

At present the Department of Environmental Protection monitors air quality in three municipalities in the Central Naugatuck Valley Region and one bordering municipality in Litchfield County. The four stations located in Naugatuck, Waterbury, Thomaston and Morris all monitor total suspended particulates but only the Waterbury and Naugatuck stations monitor nitrogen dioxide and sulphur dioxide and only the Waterbury*and Morris stations monitor ozone.[10]

The Department of Environmental Protection's air monitoring network consists of slightly over 80 stations located throughout the state. While most of these stations are located in urbanized areas (including the Waterbury and Naugatuck stations) there are several stations such as the one in Morris which monitors ambient air in the rural areas of the state.

The Morris monitoring station serves as an index of the background concentrations of pollutants within the state since there are no major direct source polluters within its vicinity. DEP has indicated that if ambient air quality at the Morris site is found at levels exceeding the National Primary or Secondary Standard for a specific pollutant then there is good reason to believe that air pollution levels throughout other rural areas of the state may be equally as high.

9 Interview with Charles Martin, Director of the Council of Governments of the Central Naugatuck Valley Region, April, 1975.

10 Department of Environmental Protection, Connecticut Air Quality Summary 1971-1973, pp.70-77.

*As of 1975 ozone is no longer monitored in Waterbury.

Before presenting the monitoring data for the Central Naugatuck Valley Region it is important to understand the underlying principles of air quality monitoring. Even though air pollution has been monitored within the state for nearly ten years there is still a great deal of question as to the accuracy, reliability and function of air quality monitoring stations.

The Connecticut Department of Health initially established the monitoring stations now being used in the CNVR partly on the basis of convenience of monitoring and reasoned guesses as to where air pollution might be the most severe. The fact that the monitoring stations in Waterbury, Naugatuck and Thomaston are all located on top of City Halls is probably due more to the convenience of reading the monitoring instruments than to any specific features of these sites which might make them representative of the highest air pollution levels in the ambient air.

Indeed there are some who feel that these stations tend to underestimate the levels of certain pollutants because of their high elevation above ground level. The fact that these monitoring stations are located on the roofs of City Halls and not at the level of the pedestrian has meant that certain pollutants such as nitrogen dioxide may be recorded at much lower levels than that found at the ground level. As an example, prior to 1975 the Waterbury monitoring station was located 55 feet above ground level even though the EPA has stipulated that sulphur dioxide, nitrogen dioxide and particulate matter monitoring stations should be located less than 50 feet above ground level. This can be seen in Table XIV which presents EPA sampling location guidelines for each pollutant category.

According to the Federal Register of August 14, 1971 "at least one sampling site must be located in the area of estimated maximum pollutant concentrations," which means that if only one sampling station exists in a municipality that station must be located in the area of highest air pollution concentrations.

This does not mean that the monitoring stations must be placed next to smoke stacks but that they should be sufficiently close to major sources of air pollution to assist DEP in anticipating air pollution disaster situations in their incipient stages.

The placement of monitoring stations is rather complex and as of yet very unscientific. Such factors as the elevation of the station, its vertical and horizontal clearance, distance from the curb, distance from the downtown and major traffic arteries, possible restrictions to the air flow in the vicinity of the sampler, nearby local sources, wind speed, wind direction, and temperature can have considerable influence on the actual readings made by monitoring instruments.

Despite the fact that no definitive methodology exists for locating a monitoring site or for handling all of the exogenous factors influencing the measurement of various kinds of pollutants, the DEP Air Monitoring Unit has indicated that the Region's monitoring stations are probably accurately depicting air pollution levels and air pollution trends in the Region. Specifically the Air Monitoring Unit has indicated that the most reliable data available for any air pollutant has been that recorded for total suspended particulate matter since the state has been recording information on this air pollutant since 1966 when the monitoring stations were being operated by the Department of Health.

Significantly over the last four years the recorded levels of particulates monitored at the four stations in the Region have consistently declined. As can be seen from Table V, between 1971 and 1974, there has been a 15.7 percent drop in the annual geometric average level of particulates in Waterbury, a 29.1 percent drop in Naugatuck, a 43.1 percent drop in Thomaston and a 26.3 percent drop in Morris. The decreasing levels of particulates recorded in the Region is partly due to: (1) the substitution of low sulphur and ash fuels, for high sulphur coal and oil; (2) the enforcement of the state's air pollution abatement regulations; and (3) a general decline in the manufacturing sector of the Region's economy which has tended to reduce the emissions from factories and businesses.

This is clearly seen in the decade of the sixties when there was a 4.5 percent decline in the total number of individuals employed in manufacturing within the Region. However, among industries which are most apt to release pollutants into the atmosphere there was an even larger decline in employment. Chemical rubber and plastics firms indexed a 10 percent decline in employment and primary metals firms had a 15.4 percent decline in employment within the Central Naugatuck Valley Region.

These developments have brought all levels of particulate matter monitored within the Region below the National Primary Standard designed to protect public health. However despite decreases at all four monitoring stations, and the achievement of the National Primary Standard, the ambient air in Naugatuck and Waterbury still exceeded the National Secondary Air standard for the entire year of 1974.

Indeed in 1973 Waterbury recorded the 5th highest annual geometric average concentration of particulate matter of the 66 monitoring stations in the state while in 1974 it recorded the second highest annual geometric average concentration of particulate matter of all 73 monitoring stations. However if the monitoring data for each city in the state is averaged for 1973 then Waterbury had the second highest annual geometric average concentration of particulate matter of the 34 different cities in the state.

Similarly in recent years Naugatuck has recorded some of the highest levels of particulate matter of any monitoring station within the state. In 1973 the monitoring station on top of the Naugatuck Town Hall recorded the 7th highest annual geometric average concentration of particulate matter in the state and in 1974 it recorded the 11th highest concentration. However if monitoring data for each city in the state is averaged for 1973 then Naugatuck had the fifth highest annual geometric average concentration of particulate matter in the state.

Over the last decade Waterbury and Naugatuck have consistently recorded levels of particulate matter in excess of most cities in the State ranking among the top

ten "dirtiest" cities in nearly every year since the State began monitoring ambient air concentrations of particulate matter. While no recent data exists on the "dirtiness" of the ambient air in the Central Naugatuck Valley Region, in 1970 the Connecticut State Department of Health's former Clean Air Commission prepared a report which indicated that Naugatuck and Waterbury had relatively high levels of dustfall per square mile. In 1970, 25.2 tons of dustfall fell on every square mile of Naugatuck during every month of the year. This was the third highest level of dustfall recorded by any monitoring station in the State during that year and the second highest average recording for any city within the State. While Waterbury air was somewhat cleaner in 1970, with approximately 16.8 tons of dustfall covering every square mile of the city each month of that year, it ranked 6th among the 25 cities that monitored dustfall.

Similarly the level of sulphur dioxide recorded in Waterbury has steadily dropped since 1971 with an annual arithmetic mean of 103 micrograms per cubic meter recorded in 1971 and only 56 micrograms per cubic meter recorded in the first eight months of 1974. The relatively low concentration of sulphur dioxide in 1974 is largely due to the absence of data for the last four months of the year. A spokesman in the DEP Air Monitoring Unit indicated that since sulphur dioxide is generally higher in the winter months and low in the summer there is good reason to believe that 1974 concentrations of sulphur dioxide were appreciably higher than 56 micrograms per cubic meter.

Despite measurement problems there appears to be a clear trend toward reduced concentrations of sulphur dioxide in the ambient air surrounding Waterbury. This decrease is due to several factors: (1) the state regulations prohibiting the use of fuels with sulphur content in excess of one half of one percent after April 1, 1973; (2) warmer winter weather over the last three years with temperatures anywhere from 2.9 percent warmer in 1975 to 9.5 percent warmer in 1973 compared to the ten year average for 1964 to 1974; and (3) higher fuel prices which have tended to reduce energy consumption and air pollution.

While sulphur dioxide levels have consistently dropped in Waterbury it probably still remains in concentrations in excess of the National Secondary standard and at levels among the highest in the state. In 1971 Waterbury had the second highest annual mean recording of sulphur dioxide of the 14 monitoring sites; in 1972 it was the third highest among 19 sites; in 1973 it recorded the highest levels and in 1974, despite the lack of data for the winter months, it recorded the fourth highest concentration of sulphur dioxide of 12 monitoring sites in the state.

Since sulphur dioxide is primarily the result of fuel combustion for home and industrial heating, sulphur dioxide levels tend to be highest in the winter and lowest in the summertime. As can be seen from Table VI the concentration of sulphur dioxide in the Waterbury atmosphere is often twice as high in the wintertime than in the summertime. Winter concentrations of SO_2 are often increased by the general wind direction prevailing in the Valley during the winter months. Winds from the North and the South tend to concentrate rather than disperse the sulphur dioxide along the Thomaston to Naugatuck industrial valley. As can be seen from Figure 2, North-South wind directions are the most common in the north central part of Connecticut occurring over 70 percent of the time in the month of January.

In contrast to sulphur dioxide, photochemical pollutants such as ozone tend to reach their highest concentrations in the summer months when sunlight is most intense. Ozone, unlike other pollutants, is not directly formed as a result of the incomplete combustion of fossil fuels or as an emission from industrial process losses. Rather it is formed as a result of the interaction of intense sunlight with automobile exhaust (nitrogen dioxide and hydrocarbons).

At present ozone poses a serious health threat to all the residents of the state since it has been recorded at levels exceeding the national ambient air standard in both urban and rural areas. The Department of Environmental Protection feels

that this is largely due to the influence of southwesterly winds which bring New York photochemical pollutants into Connecticut during the summertime. Figure 2 indicates that southerly or southwesterly winds occur as often as 40 percent of the time in the month of July in north central Connecticut. According to a recent study on Ozone Transport done by several engineers at DEP, as much as two-thirds of all the ozone recorded on one summer day of 1974 when the winds were from the south or the southwest originated from New York.[11] Generally ozone reaches peak levels around 12:00 or 1:00 in the afternoon but on days when the winds are from the southwest ozone levels continue to rise till approximately 7:00 in the evening as the New York air mass moves northward and eastward passing through the State.[12] The State of Rhode Island, being further down the New England air stream from New York, has registered its highest levels of ozone at 2:00 in the morning. This is clearly a time of day when local sunlight could not possibly play a role in the formation of ozone.

As a result of New York's pollution moving into this state and adjoining states, ozone levels in rural areas have tended to be as high or higher than those recorded in the urbanized areas. In fact in 1974 the monitoring station at Morris dam recorded concentrations of ozone exceeding the national primary ambient air standard on more days than did the monitoring station located on top of Waterbury's City Hall Building. Waterbury recorded ozone levels above the national primary standard of .08 parts per million (maximum one hour concentrations) on 42 days during the summer of 1974 while Morris recorded 44 days above the national primary standards (see Table II). It is worth noting that federal standards only allow the maximum one hour concentration of .08 ppm of ozone to be exceeded once each year.

As can be seen from Table II in the month of June 1974 the maximum one hour recorded levels of ozone reached as high as .252 parts per million in Waterbury

[11] R.A. Rubino et al. Ozone Transport, Paper #75-071, p.1.
[12] Ibid.

and .225 ppm in Morris. However, more significantly in 1974 the average daily maximum hour of ozone in Morris exceeded the national primary standard for three straight summer months and in Waterbury for two consecutive months. While these two monitoring stations are probably representative of the levels of ozone in the central and northern parts of the CNVR they may underrepresent the ozone problem in the southern fringes of the Region. According to the DEP's monthly activities report for June, 1974, the highest ozone concentrations in the State were recorded in urbanized areas immediately to the south, east and west of the CNVR.[13]

It is worth noting that in 1974 the maximum one hour concentrations of ozone in Waterbury was comparable to that monitored in some of America's largest cities. The Los Angeles County Air Pollution Control District has indicated that the maximum one hour concentration of ozone in downtown Los Angeles was .25 parts per million for the entire year of 1974 while the New York City Department of Air Resources recorded .172 parts per million of ozone in 1974 during the maximum hour concentration in Midtown Manhattan. Clearly the maximum one hour concentrations of ozone recorded in Los Angeles, New York and Waterbury are similar. However there was a wide difference among these three cities on the number of days on which ozone exceeded the national primary standard. Los Angeles being located in a subtropical climate recorded 144 days over the primary standard while Waterbury and New York being located in cooler temperate climates recorded 42 and 29 days over the primary standard, respectively.

Other pollutants monitored within the Region pose less of a problem. As can be seen from Table III, annual average recordings of nitrogen dioxide in Waterbury and Naugatuck fall well below the national primary and secondary standard. While none of the monitoring sites in the Region record carbon monoxide or hydrocarbon levels, based on estimates made by the DEP and the EPA

[13] Department of Environmental Protection, Monthly Report of Activities, Air Compliance Unit, July 25, 1974, p.12.

there is reason to believe that these two types of pollutants are a serious air pollution problem in the Waterbury and Naugatuck urbanized areas.

Furthermore monitoring data collected in 1970 by the Connecticut Department of Health indicates that Naugatuck and Waterbury had relatively high concentrations of nitrate, zinc, cadmium, sulfate and benzene soluble organics compared to most Connecticut cities. In 1970 Naugatuck had the highest level of nitrate, the fourth highest level of sulfate and the fifth highest level of benzene soluble organics of 25 Connecticut Cities.

During the same year Waterbury had the highest level of cadmium, the second highest level of zinc, the third highest level of nitrate, the seventh highest level of sulfates and the sixth highest level of benzene soluble organics. While there are no federal or state health standards for these pollutants, a study prepared by Chess in 1970-1971 indicates that long term exposures to sulfates in concentrations of 15 micrograms per cubic meter are sufficient to cause adverse health effects within the general population. While no evidence is available on the present concentrations of sulfates in Waterbury and Naugatuck, the Department of Health recorded concentrations of sulfate at 14.9 micrograms/cubic meter in Waterbury and 17.6 micrograms/cubic meter in Naugatuck during the year 1970.

Abatement of Air Pollution

Perhaps the most successful technique of reducing air pollution so far has been the state regulation prohibiting the use of fuel oils with a high sulphur content. Effective April 1, 1973 all fuel oils sold or burned within the State of Connecticut must contain less than one-half of one percent sulphur.[14]

In addition, the Department of Environmental Protection has established air quality standards by which to monitor emissions originating from (1) stationary and mobile point sources and from (2) indirect sources such as buildings, facilities or shopping centers that create activity resulting in the emission of air pollutants. With the exception of motor vehicles most large point source polluters in the State of Connecticut are required to be registered and on file with the Department of Environmental Protection. DEP does not require small operations, processes or activities such as owners of home heating equipment to register with the State[15] As a result the State's enforcement powers are primarily geared to industrial, commercial and public facility point source polluters. At present the division of air compliance of the Department of Environmental Protection has received registration statements from approximately 75 businesses, industries and public facilities in the Central Naugatuck Valley Region.[16] Of these large point source polluters approximately 64 percent are located in Waterbury, 14 percent in Naugatuck with the remainder scattered throughout the rest of the Region.

On the basis of the information received on the registration reports, the Division of Air Compliance of DEP can determine the proper monitoring equipment that each

[14] Department of Environmental Protection, Administrative Regulations, Abatement of Air Pollution, April, 1972, Section 19-508-19(a)(2), p.15.

[15] Department of Environmental Protection, Administrative Regulations, Abatement of Air Pollution, April 1972, Section 19-508-2(8), p. 2.

[16] Department of Environmental Protection, Engineering Division, Public Files of Point Source Polluters, April, 1975

company should install to record and quantify the level of pollutants escaping into the atmosphere.

However, at present the Department of Environmental Protection regulations (Section 19-508-4(b)) simply require that "photoelectric or other equally effective smoke and opacity detectors" be used to continuously monitor emissions from fuel burning equipment burning number 6 residual oil, incinerators having a maximum rated capacity in excess of 2,000 pounds per hour, fuel burning equipment having a maximum rated capacity of 5 million BTU per hour or a process source emitting in excess of 25 pounds per hour when operated at maximum capacity.

Another method of curtailing air pollution has been through the use of the DEP's compliance schedule for point source polluters. Each point source in violation of state regulations has been given a compliance deadline in order to ensure that State air quality standards are achieved and maintained within a specified time period. With a few exceptions the DEP regulations initially required all point source polluters to be in compliance as of April 1, 1974. Despite the fact that DEP allowed existing point sources a year and a half to comply with the regulations many industries in the state and the Central Naugatuck Valley Region were unable to keep to their schedule.

Since the DEP began issuing orders in 1971 a total of 26 point source polluters have been located in the Central Naugatuck Valley Region. As of May 25, 1975, there are still ten point sources within the CNVR in violation of the regulations. Of these ten point source polluters there is reason to believe that three of them may take an additional year or more to achieve compliance. These are Waterbury Rolling Mills, Fleischer Finishing Company, and Bristol Flowed Gasket. Of these three only Bristol Flowed Gasket has been granted a variance of the regulations

which would allow them until October 6, 1975 to comply. The other two companies have already passed some of their compliance deadlines with Fleischer Finishing Company scheduled to comply on May 23, 1975 on one violation and on August 20, 1975 on another while Waterbury Rolling Mills was scheduled to comply in 1973 and is still a long way from achieving compliance.

For those companies that have not sought a variance request, the DEP periodicallly conducts inspections and checks for any further point source violations. In the event a violation is found, the company or organization has a 30 day grace period in which to comply with state regulations. If the company is not able to comply with state regulations, it may request a variance of the regulations based on the economic hardship of installing expensive emission control devices. However, if the company does not petition for a variance of the regulations, it must comply with the regulations or face monetary fines as high as $5,000 for each week that it remains in violation of the law.[17]

A second air pollution abatement strategy being implemented by the Department of Environmental Protection is to limit air pollution through land use controls. As of October 1, 1974, the Department of Environmental Protection established regulations designed to modify the construction or reconstruction of structures or facilities that might prevent the State from achieving or maintaining ambient air quality standards.[18] Indirect sources of air pollution falling under DEP regulations include such facilities as shopping centers, restaurants, parking lots, industries, medical centers, amusement parks and highways to mention a few. In the event that these facilities directly or indirectly generate air pollution in volumes that would violate the national ambient air standards they are required to obtain a permit from DEP. The indirect source regulations are aimed at reducing emissions

[17]Administrative Regulations, Abatement of Air Pollution, Section 19-508-12(c), p.11.

[18]Department of Environmental Protection, Rules and Regulations Concerning Indirect Sources of Air Pollution, August, 1974.

from source polluters by: (1) limiting or modifying traffic patterns and traffic congestion; (2) influencing land uses which promote high intensity use of gasoline powered automobiles; and (3) controlling the traffic volumes created by new buildings, industries and highways being built within the State. The indirect source regulations govern all new construction which might result in the direct or indirect emission of more than 50 tons of pollutants each year by requiring these new facilities to obtain a permit from the Department of Environmental Protection and take steps to comply with DEP air quality regulations.

A list of the approximate size of the structure and facilities that are affected by this regulation appears in Table VII.

At present the indirect source regulations rely heavily on local and regional cooperation to ensure that air quality standards are achieved. In effect, this indicates that the success of the program will depend in large part on the willingness of local residents to alter their transportation habits as well as the strength of local efforts geared toward clustering future commercial and residential development. Furthermore, since air quality is a state if not an interstate problem, the success of local and regional air pollution abatement strategies will be contingent upon the: (1) wind direction and (2) the success of air pollution abatement strategies undertaken in areas contiguous to the Central Naugatuck Valley Region.

At present, there are several effective measures which may be undertaken by local automobile owners to reduce local and region-wide air pollution levels. Greater use of public bus service, increased use of carpools, proper maintenance of automobiles and programs designed to reduce the 5 day work week or allow employees to work at home may have some effect in reducing air pollution. These efforts are especially needed in the urbanized areas of the Region where lower speed limits

result in higher levels of automobile emissions per mile than found on limited access highways and major arteries connecting suburban and urban areas. As can be seen from the Table below, the average light duty automobile emits approximately twice as much pollution on local urban highways than on the faster limited access expressways. This is due to a less complete combustion of gasoline at lower speed limits as well as a greater amount of stop and go driving. However, expressways and major arterials probably contribute a greater volume of total automotive pollutants to the atmosphere than local roads since most people travel farther on limited access highways than on local roads.

GASOLINE POWERED MOTOR VEHICLE EMISSION FACTORS

	Expressway	Major Arterial (lbs/miles X10^3)	Collector	Local
Particulates	.66	.66	.66	.66
Carbon Monoxide	88.00	110.00	170.00	188.00
Sulfur Oxide	.40	.40	.40	.40
Hydrocarbons	21.50	21.50	27.00	27.00
Nitrogen Oxide	2.40	2.30	2.10	2.00
Total	112.96	134.86	200.16	218.06

SOURCE: Department of Environmental Protection, Air Compliance Unit
Connecticut Air Inventory Reference, April 16, 1975, p.16.

On a broader level it is expected that over the next ten years the amount of emissions per vehicle may continue to decrease as: (1) more effective emission control devices are installed in automobiles and (2) as the turnover of the old car population approaches one hundred percent. Under the Clean Air Act of 1970 the federal government specified that all automobiles built during or after 1975 must emit carbon monoxide and hydrocarbons at levels 90 percent below the emission of 1970 automobiles. However this standard has since been postponed till 1978 and there is a possibility that it may be delayed as late as 1981. Furthermore, while the Environmental Protection Agency initially required nitrogen oxides from 1976 automobiles to be reduced by 90 percent over emissions from 1971 automobiles, the

Federal Government has recently postponed this standard to some unspecified date in the future. Part of the reason for the postponement of the emission control standards lies in their effect on energy consumption. Emission control devices not only reduce pollution but tend to reduce the fuel economy of the automobile. Consequently, Congress, prompted by prospects of diminished supplies of petroleum, has favored energy conservation strategies rather than strategies designed to improve the environment. This decision is a severe setback to the state and the Nation's plan for reducing automobile pollution in the coming decade.

Despite the postponement of emission standards the installation of more effective emission control devices in all automobiles along with periodic inspection of these devices to prolong their life is the most important means of reducing mobile source pollution within the State. The Department of Environmental Protection's 1975 Transportation Control Strategy indicates that of their 13 transportation control programs the Federal Motor Vehicle Emission Control Program (FMVECP) would have the greatest single impact on reducing automobile emissions. Based on the effect of installing emission control devices in the Greater New York-New Jersey-Connecticut area, Tri-State Regional Planning Commission estimates that if EPA emission standards were adhered to, by 1980 average carbon monoxide emissions from automobiles would be only 24 percent of 1970 carbon monoxide emissions rates, 22.2 percent of 1970 exhaust hydrocarbons, 44 percent of 1970 nitrogen oxides and 10.3 percent of 1970 evaporative hydrocarbons emissions.[19] By 1990 Tri-State Regional Planning Commission estimates that the reductions would be even more dramatic with carbon monoxide emission rates being only 6.7 percent of 1970 emission rates, 9.7 percent in the case of exhaust hydrocarbons, 21.4 percent for nitrogen oxides and 5.1 percent for evaporative hydrocarbons.[20]

[19] Tri-State Regional Planning Commission, Mobile Source Emissions Models and Estimates for the Tri-State Region, New York, June, 1974, p.16.

[20] Ibid.

By far the most important reason for eliminating air pollution is because it poses a threat to the health of large numbers of the Region's population. While the multitude of different types of pollutants emitted into the atmosphere often makes it difficult to single out the effect of any specific pollutant on the health of the population it is generally agreed that sulfur dioxide and particulate matter pose the most serious threats to health. When these pollutants are found in concentrations in excess of the National Primary Standard there is a strong danger that the elderly, the young and those suffering from respiratory ailments may be more vulnerable to increased respiratory problems. As can be seen from Tables IX and X, the threshold levels at which sulphur dioxide and particulate matter affect human health are commonly exceeded in the Waterbury, Naugatuck, and Thomaston urbanized areas. As can be seen from Table XI short term levels of particulate matter in the Waterbury area exceeded the threshold level at which adverse affects have been noticed on human health for 8 of the 12 months of 1974, for 9 months in Naugatuck and for two months in Thomaston. In addition there is reason to believe that these pollutants may pose a threat to health at levels appreciably below the National Standard when they are found in combination with suspended sulphates. A report prepared by the Environmental Protection Agency states,

> "Our data indicates that adverse effects on elderly subjects with heart and lung disease and on panels of asthmatics are being experienced even on days below the national primary standard for 24 hour levels of sulphur dioxide and suspended particulates. These adverse health effects should be attributed to suspended sulphate levels rather than to the observed concentrations of (sulphur dioxide and suspended particulates.[21]

While ozone is a less dangerous air pollutant than particulate matter and sulphur dioxide there is reason to believe that it may cause considerable discomfort and irritation to the population at the levels at which it has been recorded in the Central Naugatuck Valley Region. Table XII indicates that 30 minutes exposure

[21] The Environmental Protection Agency, Health Consequences of Sulphur Dioxide, A Report from Chess, 1970-1971, Office of Research and Development, North Carolina, May, 1974, pp. 7-20.

to ozone at concentrations of .28 part per million result in pronounced dryness of throat and tingling of the nose and longer intermittent exposures over a two week period at levels between .1 and 1.0 parts per million result in complaints of shortness of breath and continuous headache. As can be seen from Table II these levels of ozone are commonly experienced in Waterbury and the surrounding municipalities of the Region. Besides posing a danger to those with fragile health, air pollution affects large numbers of industrial workers who are exposed to higher than normal concentrations of air pollution on a daily basis. According to Dr. Brackett, Director of the St. Mary's Hospital Pulmonary Division, bronchitis is one of the most common respiratory ailments found in the Central Naugatuck Valley Region accounting for over 28% of the 643 respiratory cases diagnosed by the Pulmonary Division of St. Mary's Hospital during 1974 (see Table VIII). In addition the Director of the Pulmonary Division indicated that there were many more respiratory ailments than might be indicated by the primary diagnosis since patients often come to the hospital for non-respiratory problems and are then found to be suffering from a respiratory ailment as well.[22]

While ambient air quality has improved over the past five years in the CNVR the Director of the St. Mary's Hospital Pulmonary Division indicated that the number of cases of respiratory ailments has continued to rise. In part this reflects a growing medical interest in respiratory diseases and a growing concern for the care of those affected by respiratory problems.

[22] Interview with Doctor Brackett, Director of St. Mary's Hospital Pulmonary Division, April 1975.

AIR QUALITY CONTROL REGIONS IN CONNECTICUT

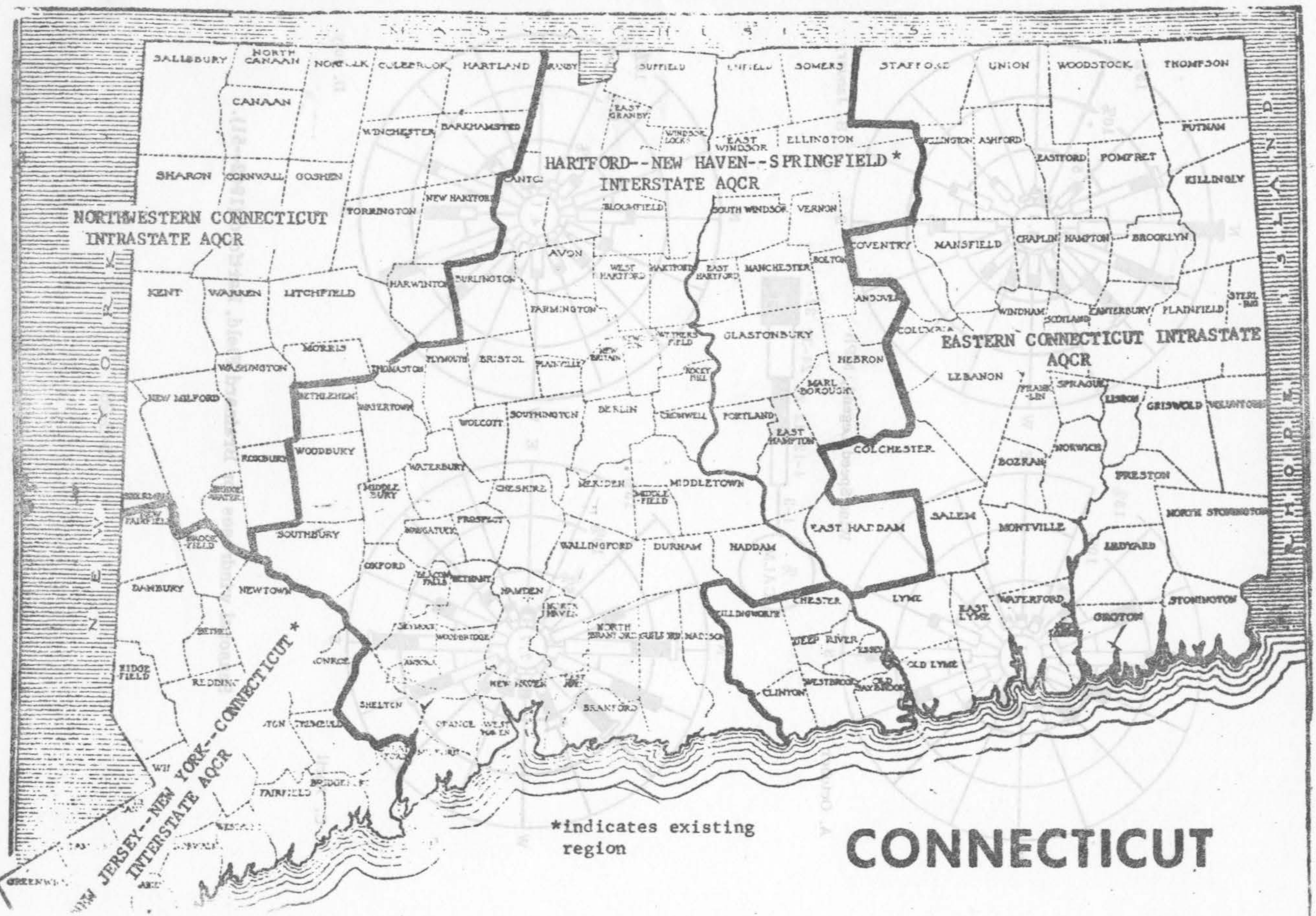
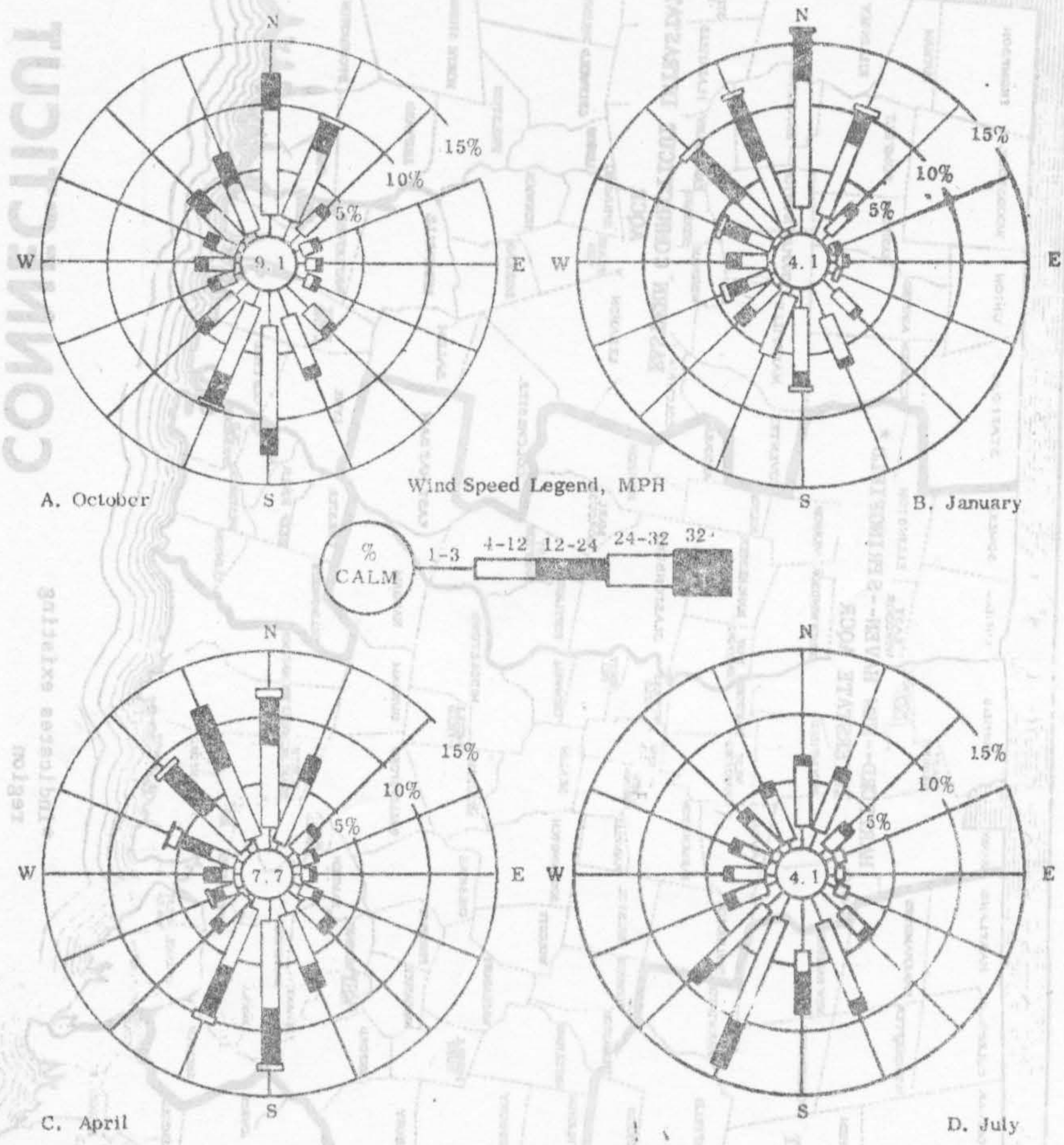


FIGURE 1

C3-E-X

FIGURE II



Seasonal windroses for Brainard Field, Hartford (1942--51).

TABLE I

NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standard	Secondary Standard
Particulate Matter		
Annual geometric mean	75	60**
Maximum 24-hr concentration*	200	150
Sulfur Oxides		
Annual arithmetic mean	80 (.03 ppm)	
Maximum 24-hr concentration*	365 (.14 ppm)	
Maximum 3-hr concentration *		1300 (.5 ppm)
Carbon Monoxide		
Maximum 8-hr concentration *	10 (9 ppm)	same as primary
Maximum 1-hr concentration *	40 (35 ppm)	same as primary
Photochemical Oxidants		
Maximum 1-hr concentration *	160 (.08 ppm)	same as primary
Hydrocarbons		
Maximum 3-hr concentration * (6-9 a.m.)	160 (.24 ppm)	same as primary
Nitrogen Oxides		
Annual arithmetic mean	100 (.05 ppm)	same as primary

All measurements are expressed in micrograms per cubic meter, except for carbon monoxide, which is measured in milligrams per cubic meter.

*Not to be exceeded more than once a year.
**Guide to achieving the 24 hour standard

TABLE II

The Level of Ozone in the Central Naugatuck Valley: 1974
(in parts per million)

	Maximum Hour		Average of Daily Maximum Hours		Number of Days with at Least One Hour over .08 ppm	
Month	Waterbury	Morris	Waterbury	Morris	Waterbury	Morris
May	.175	.09	.068	.060	3 of 12	1 of 8
June	.252	.225	.079	.102	9 of 26	18 of 27
July	.249	.160	.093	.082	15 of 31	14 of 31
August	.187	.174	.095	.084	15 of 29	10 of 23
September	N.A	.085	N.A.	.042	N.A.	1 of 15

SOURCE: The Monitoring Division of the Department of Environmental Protection, 1975.

TABLE III

Monthly Averages of Nitrogen Dioxide (NO_2) Monitored* in Waterbury and Naugatuck: 1974
(micrograms/cubic meter)

Month	Waterbury Mean	Waterbury Maximum	Naugatuck Mean	Naugatuck Maximum
January	85.6	122.0	51.2	72.0
February	85.4	107.0	60.2	98.0
March	63.4	90.0	45.4	73.0
April	79.8	114.0	6.0	11.0
May	57.0	81.0	54.8	86.0
June	46.8	85.0	39.4	63.0
July	52.2	70.0	47.6	72.0
August	50.8	81.0	41.4	64.0
September	58.8	96.0	53.3	75.0
October	65.5	102.0	40.2	50.0
November	67.0	131.0	62.0	118.0
December	51.4	61.0	54.7	74.0
Annual	63.6	131.0	46.2	118.0

*The method of determining the volume of NO_2 in the atmosphere was changed as of April, 1974. Data for January, February and March is not entirely comparable to data obtained in later months of the year.

SOURCE: The Air Monitoring Division of the State of Connecticut, Department of Environmental Protection, Hartford, Conn., April, 1975.

Annual Averages of Nitrogen Dioxide in Waterbury and Naugatuck: 1973-1974

Year	Waterbury	Naugatuck
1973	61.75	66.85
1974	63.6	46.2

Table IV A

Summary of Air Quality Violations of Industries within the CNVR not in Compliance with Air Quality Standards: June, 1975

	Industry	Existing Violations of Section #	Number of Violations Pending DEP Retest	Compliance Deadline	DEP Estimate of Compliance
1.	Bristol Flowed Gasket	20(f1)	1	10/6/75	probably 1976
2.	Chase Brass and Copper	18e	1	6/1/73	probably mid 75
3.	Fleischer Finishing Co.	19 & 23	2	5/23/75 8/20/75	probably 1976 probably 1976
4.	Naugatuck Glass Co.	20(f2)	1	5/30/75	probably in compliance
5.	New Haven Trap Rock Co.	18(2)	1	5/10/73	probably in compliance
6.	Scovill Manufacturing	18a(1ii) 18e & 7a	7	7/21/75 6/30/75	probably in compliance probably late 1975
7.	Somers Thin Strip	18a(1i)	1	4/28/75	probably in compliance
8.	UniRoyal Chemical Co.	20(f2)	1	9/30/73	probably in compliance
9.	UniRoyal Footwear	20(f1) 20(f2)	3	4/1/74 2/1/74	probably 1976 probably 1976
10.	Waterbury Rolling Mills	18(e)	1	Jan/1973	probably late 1976

Source: Air Compliance Unit of the State of Connecticut Department of Environmental Protection, Compliance Schedule Book, May, 1975.

Table IV6B

Annual Emissions of the Largest Polluters within the CNVR: June, 1975

Municipality	Industry	Type of Emission	Quantity** (tons/year)
Waterbury	Scovill Manufacturing Co.	Metal Chips	1.4
		Saw Dust, Chips	82.3
		Oil Mist	10.8
		SO_x	1,088.0
		Particulates	206.0
		Blacothene M.D.	42.5
		Zinc Oxide	2.5
		NO_x	720.4
		CO	92.9
		H_2	18.2
		Total	2,265.0
Waterbury	Somers Thin Strip Brass	Chlorinated HC	144.0
		Particulates	2.88
		SO_2	4.92
		Total	151.80
Waterbury	Waterbury Rolling Mills	N.A.*	100+
Waterbury	Bristol Flowed Gasket	Toulene	72.56
		Plasticizer	7.26
		Total	79.82
Waterbury	Chase Brass & Copper Co.	Fly Ash	1.3
		SO_x	12.4
		Particulates	86.6
		Nitric Acid	7.75
		Total	118.05
Waterbury	Fleischer Finishing, Inc.	Knitting Oil	61.0
		Inorganic Chemicals	4.5
		Fly Ash	14.2
		SO_x	5.42
		Total	85.12
Waterbury	New Haven Trap Rock Co.	Sand, Dust	100+

*Not Available

**This includes controlled and uncontrolled emissions.

Table IV B (continued)

Municipality	Industry	Type of Emission	Quantity** (tons/year)
Waterbury	Oneglia and Gervasini	Particulate Matter	100+
Waterbury	Waterbury Municipal Incinerator	Particulates	183.5
		NO_x	67.68
		CO	216.0
		Total	467.18
Waterbury	Anaconda American Brass Co.	Particulates	41.63
		SO_x	115.93
		CO	.29
		Hydrocarbon	3.88
		NO_x	104.37
		Sodium Chromate	5.0
		Nitric Acid	161.0
		Sulphuric Acid	75.0
		Kemtex	184.02
		Total	691.12
Waterbury	Sherwood Industries	Nitric Acid	140.5
Naugatuck	Uniroyal Chemical Div.	Solvenol & Mineral Spirits	87.6
		Mineral Spirits	3.2
		SO_2	435.1
		SO_3	13.01
		Particulates	36.73
		Lint	89.7
		Total	665.34
Naugatuck	Uniroyal Consumer Products Div.	Smoke & Ammonia	163.1
		Smoke & Oil Vapor	156.1
		Solvent Vapor	64.0
		Cement Vapor	152.0
		Solvasol Vapors	458.0
		Chemical Powders	7.35
		Rubber Particulates	50.4
		Smoke Particulates	17.0
		Cork Particulates	0.77
		Total	1,068.72

SOURCE: Air Compliance Unit of the State of Connecticut Department of Environmental Protection, Public Files of Point Source Polluters, April, 1975.

Table V

Annual Geometric Averages of Total Suspended Particulates within the Central Naugatuck Valley Area: 1966-1974
(Micrograms/Cubic Meter)

Year	Waterbury[1]	Naugatuck[2]	Thomaston[3]	Morris[4]
1966	86.	68.	72.	N.A.
1967	79.	91.	87.	34.
1968	98.	111.	82.	63.
1969	104.	106.	70.	45.
1970	108.	102.	82.	51.
1971*	85.8	86.2	73.4	37.6
1972*	83.9	72.1	67.7	34.7
1973*	76.9	69.4	39.7	31.4
1974*	72.3	61.1	41.7	27.7

*Although Federal Standards are expressed in Geometric Averages, there is no data available for Annual Geometric Average Concentrations of Total Supsended Particulates for any of the years prior to 1971.

[1]Monitored on top of City Hall.
[2]Monitored on top of City Hall.
[3]Monitored on top of City Hall.
[4]Monitored three feet above the Morris Dam.

SOURCE: Air Monitoring Division of the State of Connecticut, Department of Environmental Protection, Hartford, Connecticut, April, 1975.

TABLE VI

Monthly, Annual Average* and Maximum Hourly Concentrations of Sulphur Dioxide in Waterbury: 1974

(in parts per million-ppm)

Month	PPM Monthly Mean	mg/m^3 Monthly Mean	PPM Hourly Maximum	mg/m^3 Hourly Maximum
January	.0420	110.04	.213	558.06
February	.0317	83.05	.173	453.26
March	.0228	59.73	.098	256.76
April	.0166	43.49	.079	206.98
May	.0133	34.84	.057	149.34
June	.0248	64.97	.075	196.50
July	.0187	48.99	.055	144.10
August	.0148	38.77	.253	662.8
Average	.	60.48		
1971		103.		
1972		93.		
1973		84.		
1974 (8 months)		60.48		

*Arithemetic Average

Note: PPM SO_2 x 2620 = micrograms/cubic meter of SO_2

SOURCE: Air Monitoring Division of the State of Connecticut, Department of Environmental Protection, Hartford, Connecticut, April, 1975.

TABLE VII

INDIRECT SOURCE PERMIT LIMIT GUIDELINE[1]

Any proposed indirect source which is described here shall submit a permit application and must receive a Permit to Construct before commencing construction.

Type of Source	Permit Limit
Shopping Center	90,000 sq. ft. GFA[2] or more
Office Building	220,000 sq. ft. GFA or more
Multi-Family Dwelling	630 Dwelling Units or more
Single Family Dwelling	500 Dwelling Units or more
Independent Parking Garage	400 Parking Spaces or more[3]
Hospital	380 Beds or more
Medical Clinic	80 Doctors or more
Motel/Hotel	630 Rooms or more
Sports Complex/Entertainment Theater	1250 Seats or more
School/College	1660 or more students
Roadway/Highway	1,000 Directional Design Hourly Volume (DDHV) or more[4]
Airport	50,000 Commercial Flights Per Year or more
Office Building and Shopping Center	110,000 sq. ft. GFA or more (off.) and 50,000 sq. ft. GFA or more (s.c.)
Office Building and Residential Dwellings	110,000 sq. ft. GFA or more (off.) and 315 Dwelling Units or more (res.)
Shopping Center and Residential Dwellings	50,000 sq. ft. GFA or more (s.c.) and 315 Dwelling Units or more (res.)
Other	Any proposed indirect source which has either 400 parking spaces or 60,000 sq. ft. GFA may need a Permit to Construct. The owner or operator of any such source must file an information sheet titled "Indirect Source Questionnaire" (A.P. Form-I.S.Q.) with: Department of Environmental Protection Air Compliance Indirect Source Group, State Office Building, Hartford.

TABLE VII (continued)

TYPE OF SOURCE	PERMIT LIMIT
Other	Connecticut 06115. The owner or operator will be notified within ten (10) days after the questionnaire is received whether a Permit is required.

[1] The limits are based on the generation of 500 vehicle trips during the indirect source's peak hour of traffic generation. A facility with such operating characteristics is likely to cause the emission of 50 tons of pollutants annually.

[2] GFA: Gross floor area in square feet.

[3] A parking garage associated with another indirect source (e.g., hotel parking garage, hospital parking garage, sports complex parking garage, etc.) must apply for a permit if it has 400 or more parking spaces in excess of the number mandated by the local building regulations for the particular indirect source being served.

[4] DDHV refers to the volume of traffic in one direction; not the total volume of traffic on the road.

TABLE VIII

Source of Air Pollution in the New Haven-Hartford
Air Quality Control Region: 1972 (in percents)

	Fuel Combustion	Industrial Process Losses	Solid Waste Disposal	Transportation	Miscellaneous	Total
Sulphur Dioxide	95.3	.01	1.5	3.2	0.	100
Particulate Matter	59.1	24.0	1.2	15.7	0.	100
Nitrogen Dioxide	40.8	.20	.3	58.7	0.	100
Hydrocarbons	1.6	7.9	.5	78.4	1.6	100
Carbon Monoxide	.5	negligible	.3	99.1	0.	100

SOURCE: United States Environmental Protection Agency, Office of Air and Water Management, 1972 National Emissions Report, North Carolina, 1974, p.51.

TABLE IX

Best Judgment Estimates of Pollutant Thresholds for Adverse Effects of Long Term Exposures

	Threshold (annual Average) Micrograms/Cubic Meter		
Effect	SO_2 (80)*	Total Suspended Particulates (75)*	Suspended Sulphates No Standard
Increased Prevalence of Chronic Bronchitis	95	100	15
Increased Acute Lower Respiratory Diseases in Children	95	102	15
Increased Frequency of Acute Respiratory Diseases in Families	106	151	15
Decrease Function of Children	200	100	15

TABLE X

Best Judgment Estimates of Pollutant Thresholds for Adverse Effects of Short Term Exposures

	Threshold (annual average) Micrograms/Cubic Meter		
Effect	SO_2 (365)*	Total Suspended Particulates (260)*	Suspended Sulphates No Standard
Aggravation of Cardiopulmonary Systoms in Children	365	80-100	8-10
Aggravation of Asthma	180-250	70	8-10

*National Standard

SOURCE: Health Consequences of Sulphur Dioxide: A Report from Chess, 1970-1971, U.S. Environmental Protection Agency, Office of Research and Development, North Carolina, May, 1974.

TABLE XI

Monthly Average and Maximum Recorded Levels
of Total Suspended Particulates in the
Central Naugatuck Valley: 1974

(ug/m^3)

	Waterbury		Naugatuck		Thomaston	
Month	Mean	Maximum	Mean	Maximum	Mean	Maximum
January	122.0	148.	80.0	103.	60.6	97.
February	140.0	237.	92.6	137.	67.6	114.
March	97.4	161.	53.4	104.	39.6	67.
April	142.0	142.	75.4	141.	53.2	102.
May	75.8	129.	93.4	144.	45.8	86.
June	63.6	88.	60.0	98.	46.4	69.
July	68.0	85.	63.8	82.	66.0	91.
August	61.3	94.	57.4	76.	43.8	71.
September	54.3	80.	50.6	107.	28.0	66.
October	58.3	115.	41.4	78.	23.8	33.
November	57.8	119.	78.6	121.	44.6	71.
December	94.8	127.	77.3	140.	52.3	78.
Annual	82.78	237	68.8	144	48.45	114.
Minimum Observation :	14.0		21.0		9.0	

SOURCE: The Air Monitoring Division of the State of Connecticut, Department of Environmental Protection, April, 1975.

TABLE XII

Summary of Effects of Short Term Exposures of Ozone on Man

Concentration (PPM) and Pollutant	Exposure Period	Effect
.05 Ozone	Instantaneous	Odor recognized
.05 Ozone		Irritation threshold
.10 Ozone	Instantaneous	Eye irritation widely experienced in community panel studies
.11 Ozone	30 minutes	Slight dryness of throat (sensitive humans)
.28 Ozone	30 minutes	Pronounced dryness of throat, tingling of nose
.10 to 1.0 Ozone	Intermittent exposures of this range of levels over a 2 week period	Complaints of shortness of breath and continuous headache
.31 Ozone	15 minutes	Distinct irritation of respiratory organs
.34 Ozone	55 minutes	Slight choking feeling in throat, irritation of nose, prickly feeling of conjunctiva
.8 Ozone	Single two hour exposure	Significant lung function changes after the exposure which lasted less than 24 hours. Subternal soreness, tracheal irritation, and slight dry cough disappearing within 24 hours.

SOURCE: Louis S. Jaffe, Archives of Environmental Health, Vol. 16, February, 1968, "Photochemical Air Pollutants and Their Effects on Men and Animals," pp. 245-246.

Table XIII

BREAKDOWN OF RESPIRATORY SYSTEM DISEASES

BY PRIMARY AND SECONDARY DIAGNOSES

As Reported by St. Mary's Hospital

JANUARY - DECEMBER, 1974

DIAGNOSIS	PRIMARY DIAGNOSIS	SECONDARY DIAGNOSIS	TOTAL CASES
Pneumonia, NOS+	104	132	236
Pulmonary Emphysema	65	165	230
Chronic Obstructive Lung Disease	73	135	208
Bronchopneumonia	59	35	94
Carcinoma of Bronchus/Lung	73	14	87
Bronchitis, Unqualified	23	42	65
Pulmonary Collapse	13	52	65
Bronchitis, NEC*	13	48	61
Mixed Asthma	34	26	60
Lobar Pneumonia	43	15	58
Acute Bronchitis	35	23	58
Viral Pneumonia	19	4	23
Pleural Effusion	3	20	23
Pleurisy	9	11	20
Lung Disease, NEC*	4	15	19
Obstructive Chronic Bronchitis	9	9	18
Bronchiectasis	4	13	17
Chronic Fibrosis of Lung	2	14	16
Spontaneous Pneumothorax	11	3	14
Lung Congestion	6	7	13
Pulmonary Tuberculosis	5	6	11
Bronchotracheal Disease	4	5	9
Respiratory Disease	2	6	8
Lung Abscess	3	5	8
Aspiration Pneumonia	2	5	7
Pleural Effusion, Except TB	2	5	7
Pneumococcal Pneumonia, NEC*	3	4	7
Bacterial Pneumonia, NEC*	4	3	7
Friedlander's Pneumonia	1	4	5
Acute Bronchiolitis	2	3	5
Influenza	2	2	4
Exogenous Asthma	3	1	4
Acute Pulmonary Edema	2	2	4
Pneumoconiosis	0	4	4
Staphylococcal Pneumonia	1	2	3
Lung Empyema and Fistula	1	1	2
Lung Empyema	1	1	2
Idiopathic Fibrosing Alveolitis	0	2	2
Hemophilus Influenza Pneumonia	1	0	1
Pneumonia, NEC*	1	0	1
Respiratory Disease due to Inhalation of Gases	1	0	1
TOTAL	643	844	1,487

*Not Elsewhere Classifiable
+Not Otherwise Specified

Source: Records Division of St. Mary's Hospital, May, 1975.

Table XIV

SAMPLING LOCATION GUIDELINES FOR AREAS
OF ESTIMATED MAXIMUM POLLUTANT CONCENTRATION

Pollutant Category	Pollutant	Station Location	Position of Air Inlet: Height from Ground, ft.	Position of Air Inlet: Vertical Clearance Above Supporting Structure, ft.	Position of Air Inlet: Horizontal Clearance Beyond Supporting Structure, ft.[a]
Primary Stationary Source Pollutant	1. SO_2	Determined from atmospheric diffusion model, historical data, emission density or other information and representative of population exposure.	≤50	3+	5+
	2. NO_2	Same as above.	≤50	3+	5+
	3. Particulates	Same as above.	≤50	3+	3+
Primary Mobile Source Pollutant	1. CO (1 hr. averaging time)	Representing area of high traffic density, slow moving traffic and obstructions to air flow (tall buildings) and pedestrian population such as major downtown traffic intersections. ≤20' from street curb.	≤15	3+	3+
	2. CO (3-hr. averaging time)	Representing area of high density in residential area such as major thoroughfare in center city or suburban area. ≤0' from street curb.	≤15	3+	3+
Secondary Pollutant	1. O_x	Representing residential area downwind of downtown area (5-15 miles from downtown and 300+' from major traffic arteries or parking area).[b]	≤50	3+	5+

Table XIV (Continued)

Pollutant Category	Pollutant	Station Location	Position of Air Inlet: Height from Ground, ft.	Position of Air Inlet: Vertical Clearance Above Supporting Structure, ft.	Position of Air Inlet: Horizontal Clearance Beyond Supporting Structure, ft.[a]
Secondary Pollutant	2. NO_2	Representing residential area downwind of downtown area (<5 miles from downtown).[b]	<50	3+	5+

a. not applicable where air inlet is located above supporting structure

b. downwind of prevailing daytime wind direction during the oxidant season

SOURCE: The Environmental Protection Agency, National Environmental Research Center, Division of Atmospheric Surveillance, Research Triangle Park, North Carolina, as cited in the EPA Federal Register, August 14, 1972.

GOAL: To achieve and maintain clean air in order to protect the health and general welfare of the Region's population.

OBJECTIVE I: To reduce the number of vehicle miles traveled in the Central Naugatuck Valley Region.

Policy I.1: To encourage the use of carpooling among all commuters.

Policy I.2: To encourage the substitution of two-way cable television communication for all unnecessary automobile commuting trips within the Region.

Policy I.3: To expand the geographical coverage of public bus service to all municipalities in the Waterbury urbanized area.

OBJECTIVE II: To reduce traffic congestion in the urbanized areas of the Region.

Policy II.1: To encourage employers to stagger work hours to cut down on commuter congestion.

Policy II.2: To encourage employers to provide financial incentives to employees utilizing carpools or public bus service.

Policy II.3: To encourage the state to allow right hand turns to be made after a full stop at a red light.

OBJECTIVE III: To reduce the level of air pollutants emitted by mobile sources.

Policy III.1: To encourage periodic maintenance and inspection of all motor vehicles.

Policy III.2: To encourage automobile owners to periodically inspect and maintain their emission control devices and to keep their vehicles well-tuned.

OBJECTIVE IV: To encourage the use of energy sources that burn cleaner, create fewer hazardous pollutants and allow for more economic

installation of emission control devices.

Policy IV.1: To discourage the use of motor vehicle fuels having lead additives.

Policy IV.2: To encourage the use of clean burning hardwoods in residential fireplaces.

Policy IV.3: To encourage the use of electricity for heating homes.

Policy IV.4: To encourage the development and use of electric forms of transportation.

OBJECTIVE V: To reduce stack emissions from local industry in order to minimize the health hazard posed to industrial workers and the general public.

Policy V.1: To encourage local industries violating the state's Abatement of Air Pollution regulations to comply with state emission standards as soon as possible.

Policy V.2: To encourage the reuse of gaseous and particulate emissions in industry and in solid waste recovery facilities.

OBJECTIVE VI: To promote educational programs designed to inform the public of the dangers and the means of reducing air pollution.

Policy VI.1: Local civil preparedness directors are encouraged to take an active role in coordinating local efforts at reducing air pollution and in assisting the state during air pollution emergencies.

OBJECTIVE VII: To encourage the Department of Environmental Protection to monitor the ambient air concentrations of all hazardous pollutants regulated under the 1970 Clean Air Act.

Policy VII.1: To support studies of ambient air quality in areas of municipalities where there may be high levels of toxic pollutants.

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